

Programming of Microcontroller Development Boards

Course Name	Programming of Microcontroller Development Boards
Course Name as on Certificate	Certification in Programming of Microcontroller Development Boards
Certificate Type	Certificate of Completion by IITM Pravartak and L&T EduTech
Certificate Issued by	IIT MADRAS and L&T EduTech
Course Objectives	<p>Course Overview</p> <p>In today's rapidly evolving landscape, organizations are embracing Digital Transformation in alignment with the rapid growth of Industrial Automation. As automation significantly enhances business returns, sectors such as Designing, Manufacturing, Assembling, and Logistics are transitioning into Digital Industries. One of the key elements driving this transformation is the evaluation of multi-featured, high-speed, tiny microcontrollers. The global microcontroller market is estimated to grow at a CAGR of 7.6% during 2021-2023, creating substantial job opportunities for the engineering community in the coming decade.</p> <p>The primary objective of this course is to prepare learners for these emerging job opportunities. The course on "Programming of Microcontroller Development Boards" is designed with a clear vision and roadmap, covering the fundamentals of microcontrollers, methodologies for designing microcontrollers, exploratory skills in application-specific embedded boards, and real-time industrial applications. The concepts of the course are seamlessly integrated with perfect demonstrations through a digital platform, along with use cases that ensure complete learner engagement.</p> <p>This course provides experiential knowledge and skills about embedded development boards and Integrated Development Environment (IDE) tools. Learners will be guided using a multi-purpose development board preferred in industrial applications. The pedagogy followed in the course offers learners valuable insights through demonstrations, encouraging creativity. The in-course discussions prompt learners to develop innovative embedded solutions for real-world applications.</p> <p>Join us to gain practical insights and hands-on experience in microcontroller programming and prepare yourself for the future of digital transformation and industrial automation.</p> <p>Course Objectives</p> <p>At the end of this course learners will be able to,</p> <ul style="list-style-type: none"> • Understand the fundamentals and hardware descriptions about 8051 Microcontroller. • Understand the memory organization and Special register configuration strategies in 8051 Microcontroller. • Understand the peripheral interfacing options in 8051 Microcontroller. • Understand the Instructional Set Architecture modules of 8051 Microcontroller. • Get an in-depth exposure on programming general Arithmetic, Logic and conditional Operations in 8051 Microcontroller • Get additional exposure on programming with peripheral operations in 8051 Microcontroller.

	<ul style="list-style-type: none"> • Understand a strategy to interface external I/O devices in 8051 Microcontroller. • Understand the programming procedure for Programmable Peripheral Interfaces in 8051 Microcontroller • Demonstrate prototype for Industrial Applications using Arduino UNO • Demonstrate prototype for Industrial Applications using ESP8266 • Demonstrate prototype for Industrial Applications using ESP32
Eligibility	Students pursuing Diploma / UG / PG Programs in Electrical & Electronics Engineering / Electronics and Communication Engineering
Pre-Requisites	Basic knowledge on Electronics Engineering
Target Segment	Students pursuing Diploma/ UG / PG Programs in Electronics & Communication Engineering / Electrical & Electronics Engineering. Faculties / Working Professionals in the above domains & other aspiring learners
Course Content	See Enclosed Programme details – as Annexure 1
Pedagogy	Online Self-paced E-Learning Content
Assessment	One Final Assessment
Programme Faculty	<p>Dr. B Venkatalakshmi Subject Matter Expert L&T EduTech.</p> <p>A highly qualified academician and researcher with a Ph.D in Multisource Network Coding for MANETs and an ME in Optical Communication from College of Engineering Guindy, Anna University. Her research interests include pervasive computing, network coding, RFID, digital signal processing, information theory, mobile ad-hoc networks, industrial IoT, AI and edge computing and 5G. Dr Venkatalakshmi has a wide range of research skills, including Matlab, GloMoSim, Qualnet, ADS, RFID API integration, Python, Weka and Power BI.</p> <p>With over 29 years of teaching and research experience, having served as a lecturer, professor, head of research and development department and vice principal at various educational institutions in Chennai, she has made significant contributions to academic planning and development, research planning and development and industry interactions and development. She has organised and developed the ME Mobile and Pervasive Computing syllabus and gained expertise in the domain of RFID and wireless sensor networks, training human resources in these areas. She has also established new research labs and published many research works in national and international journals.</p>
Duration	Units: 6 Hours: 11
Class Schedule	Self-Paced
Programme Highlights/USPs	<ol style="list-style-type: none"> 1. Development board-based Architecture learning, aids high retention of Microcontroller Knowledge 2. Use-cases aligned demos assures acquittance of programming skill 3. Applications covered in the course kindles the creativity of learners
Total Fees	Total Fees (Rs.)
	Total Programme Fee Rs 1,900/- inclusive of tax

ANNEXURE 1

Proposed Course outline / programme / plan - Unit wise syllabus details.

Unit 1 - 8-bit Microcontrollers Architecture
<ul style="list-style-type: none"> • The need for Microcontrollers in real-life applications • Overview of 8051 Microcontroller • The detailed Pin diagram and hardware architecture of 8051 Microcontroller • The memory models and I/O provisions in 8051 Microcontroller • A simulator sample for 8051 Microcontroller
Unit 2 - Programming of Microcontrollers
<ul style="list-style-type: none"> • Memory interfacing models • Timers and Counters features in 8051 Microcontroller • Serial I/O interfacing options in 8051 Microcontroller • Interrupt features of 8051 and • Instruction Set Architecture options of Data transfer and Logical instructions applicable in 8051 Microcontroller
Unit 3 - Programming of Microcontrollers and Timers, counters
<ul style="list-style-type: none"> • Arithmetic and conditional operations in 8051 • Subroutine models in 8051 Microcontroller • Programming of interrupts, Timers and Counters in 8051 • I/O Ports programming models of 8051
Unit 4 - Simple Applications and Programmable Peripheral Interface
<ul style="list-style-type: none"> • External I/O like Keyboards, displays etc., in 8051 • Typical ADC interfaces in 8051 Microcontroller • Serial I/O connectors in 8051 • 8255 PPI configuration in 8051
Unit 5 - Deployment of ESP32 Microcontroller for Industrial Applications
<ul style="list-style-type: none"> • Hardware Development boards Arduino UNO and ESP 8266 • Arduino IDE and its features • Development of different applications like SPMS, Inventory control and Air Quality Monitoring using above boards
Unit 6 - Exploring Arduino UNO and ESP8266 Applications
<ul style="list-style-type: none"> • Hardware Development boards ESP 32 • Development of applications like line follower, Obstacle sensing, Object counting using ESP32